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**A DUAL RESPONSE CHOICE EXPERIMENTS DESIGN TO
ASSESS WINE PREFERENCE IN CATALONIA: A
HETEROCSCEDATISTIC EXTREME-VALUE MODEL**

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1. INTRODUCTION

- ☐ **The Choice Experiments (CE) is a suitable method to analyze consumers' preferences for “complex” goods in order to evaluate simultaneously their descriptors (attributes & levels).**
- ☐ **It uses experimental design to create different hypothetical scenarios of a product (alternatives) by combining the attributes and their levels. These alternatives are later grouped in “choice sets” to be evaluated by respondent.**

1. INTRODUCTION

- ❑ Researchers usually face two approaches in the construction of choice sets:
 1. Excluding the “opt-out” option from choice sets by forcing participants to select an alternative.
 2. Including in the choice set the “opt-out” option allowing for a non-forced choice task.
- ❑ The issue of including or excluding the opt-out alternative in CE has been addressed by several studies, from which we focus on the following questions:

1. INTRODUCTION

1. Why INCLUDING an opt-out option?

- To increase the realism of the hypothetical simulated market.
- Allow to be consistent with the demand theory and enhance the theoretical validity of the welfare estimates.
- When the researcher seeks to measure market penetration

1. INTRODUCTION

2. Why EXCLUDING an opt-out option?

- The interest of the study is to compare levels and attributes or alternatives.
- The procrastination of the choice is damaging, i.e. the cost of delay is high or the product is needs urgently.
- To avoid potential “greater easy way out”

3. Why RESPONDENTS CHOOSE the opt-out option?

☐ According to **RATIONAL THEORY** individuals choose the opt-out option when there is no compelling rationale for choice:

- ✓ Difficulty to select the best alternatives
- ✓ Neither alternative stands out in comparison
- ✓ The desire to save time and effort

☐ According to **PSYCHOLOGY THEORY** they choose opt-out:

- ✓ In a high uncertainty context it is less likely to be seen as errors
- ✓ prefer bearing the consequences of inaction rather than those of wrong action

4. ECONOMETRIC IMPLICATION OF INCLUDING the opt-out?

- ☐ May cause the utilities of alternatives to be correlated, violating the IID (The Main MNL assumption).
- ☐ The IIA tends to be violated since it tends to take away greater share from certain options rather than others that individuals tend to select if the opt out is not present.
- ☐ Improves the statistical efficiency of the estimated parameters

5. Main ECONOMETRIC IMPLICATION OF EXCLUDING the opt-out?

- ☐ may overstate the likelihood that individuals would actually choose one alternative
- ☐ Implication on the implicit price estimates.

2. OBJECTIVE

- ❑ **The objective of this research is:**
 - **To assess consumer preferences and willingness to pay of red wine in Catalonia obtained from forced and non-forced choice.**
 - **To use the Dual Response choice design as an alternative to the traditional CE design usually used to compare both approach.**

3. METHODOLOGY:

3.1. The Experimental Design

- The traditional and common approach is to analyse forced versus non-forced choices is to realise two studies simultaneously

Sample 1

Choice set # 1	Alt. "A"	Alt. "B"	Alt. "C"
Attribute 1 (A ₁)	Level 1 (L _{1.1})	Level 2 (L _{1.2})	No-Choice
⋮	⋮	⋮	
Attribute n (A _n)	Level 3 (L _{4.3})	Level 1 (L _{4.1})	

1. Considering these available products "A" and "B", which product would you choose?
 "A" ☐ "B" ☐ Neither "C" ☐

Sample 2

Choice set # 1	Alt. "A"	Alt. "B"
Attribute 1 (A ₁)	Level 1 (L _{1.1})	Level 2 (L _{1.2})
⋮	⋮	⋮
Attribute n (A _n)	Level 3 (L _{4.3})	Level 1 (L _{4.1})

1. Considering that "A" and "B" are the only available products, which product would you choose? "A" ☐ "B" ☐

3. METHODOLOGY:

3.1. The Experimental Design

- The alternative approach is the Dual Response Choice Experiment design that we propose in our work.



Choice set # 1	Alt. "A"	Alt. "B"
Attribute 1 (A ₁)	Level 1 (L _{1.1})	Level 2 (L _{1.2})
⋮	⋮	⋮
Attribute n (A _n)	Level 3 (L _{4.3})	Level 1 (L _{4.1})
<p>1. Considering that "A" and "B" are the <u>only</u> available products, which product would you choose? "A" <input type="checkbox"/> "B" <input type="checkbox"/></p> <p>2. Would you purchase your chosen product? Yes <input type="checkbox"/> No <input type="checkbox"/></p>		

3. METHODOLOGY:

3.2. The Econometric modeling

- ☐ Independent of the decision to include or exclude an “opt-out option”, the usually applied model fall within the standard Multinomial Logit. The main assumption that underlie the formulation of this model is the IIA (Independence of Irrelevant Alternatives) constraint.
- ☐ Several models are defined to overcome this limitations → The HEV model relaxes the restrictive IIA property of the MNL model by allowing different scale parameters across alternatives

3. METHODOLOGY:

3.2. The Econometric modeling

- Probability that an individual will choose alternative i from the set C

$$P_i = \Pr(U_i > U_j) = \Pr(\varepsilon_j \leq V_i - V_j + \varepsilon_i) = \int_{\varepsilon_i = -\infty}^{\varepsilon_i = +\infty} \prod_{j \in C, j \neq i} \Lambda \left[\frac{V_i - V_j + \varepsilon_i}{\theta_j} \right] \frac{1}{\theta_i} \lambda \left(\frac{\varepsilon_i}{\theta_i} \right) d\varepsilon_i$$

- The above probability expression collapses to the MNL

$$P_{in} = \frac{e^{\mu V_{in}}}{\sum_{i=1}^{i=I} e^{\mu V_{in}}}$$

Are different in the HEV

- The Utility function:

$$V_{in} = ASC_{no\ choice} + \sum_k \beta_k X_{ki}$$

4. EMPIRICAL APPLICATION

4.1. Sampling

- Data used in this analysis was obtained from a face-to-face questionnaire with 400 consumers that were qualified by having purchased a bottle of wine in the last 3 months.

Population	Consumers over 20 years who purchase regularly food and are residents in the metropolitan area of Barcelona.
Sample Design	Stratified sample by age and postal districts using proportional affixation to the number of persons by stratum.
Field	Metropolitan area of Barcelona
Sample Size	400
Confidence interval	± 4.9
Confidence level	95.5% (k=2)
Control measure	Pilot survey (25 questionnaires)

4. EMPIRICAL APPLICATION:


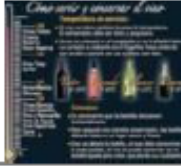


4.2. Attributes and levels & experimental design

Attributes	symbols	Levels
<i>Origin</i>	A_1	Catalonia (regional), Spain (national), Imported (international)
<i>Knowledge</i>	A_2	Own Experience, Recommendation, Prestige
<i>Variety</i>	A_3	Cabernet Sauvignon, Grenache, Merlot
<i>Price</i>	A_4	€8 , €10, €12

- ❑ A full orthogonal factorial design → 81 hypothetical products can be generated from $3^4 \times 3^4$ (6,561) possible combinations.
- ❑ Orthogonal fractional factorial design → 9 choice sets

4. EMPIRICAL APPLICATION:

4.2. Attributes and levels & experimental design

ELECTION # 1	Alternative "A"	Alternative "B"
Origin 	Foreign	Catalonia
Knowledge 	Prestigious	Personal experience
Variety 	Grenache	Merlot
Price 	€6	€14
<p>1. Considering that "A" and "B" are the only available products, which product would you choose? "A" <input type="checkbox"/> "B" <input type="checkbox"/></p> <p>2. Would you purchase your chosen product? Yes <input type="checkbox"/> No <input type="checkbox"/></p>		

5. RESULTS

5.1. HEV model results using the DRCE design

Forced Choice				Non-forced Choice			
Variables	Coeff.	Std. error	p-value	Variables	Coeff.	Std. error	p-value
Spain	0.0821	0.0393	0.036	Spain	0.0607	0.0357	0.089
Price	-0.1655	0.0214	0.000	Price	-0.1554	0.0294	0.000
				No-choice option (C)	-1.9397	0.2101	0.000
Scale Parameters of Extreme Value Distribution				Scale Parameters of Extreme Value Distribution			

- Overall, both models are highly significant and show a good fit with highly significant likelihood ratios.

- Results demonstrate that, in both models, all parameters (variables coefficients and scale parameters) are statistically significant with the exception of the level “recommended” of the “Knowledge” attribute, indicating that all the attributes considered are significant determinants of consumer welfare.

5. RESULTS

5.1. The economic interpretation: the Implicit Price-IP

<i>Attributes levels</i>	<i>Forced Choice</i>	<i>Non-forced Choice</i>	<i>% of IP difference from forced to non- forced</i>
	<i>Implicit Price</i>	<i>Implicit Price</i>	

- ☐ Comparing results obtained from the step 1 of the DRCE (forced choice) and step 2 (non-forced choice), attributes have the same ranking score.
- ☐ IPs are relatively in the same range in both models similar with some exceptions.
- ☐ In some cases forced choice gives higher value as expected but for some levels was not the case (Catalonia, prestige and varieties).

Significance levels: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. -: Non-significant differences between IP

6. CONCLUSIONS

6.1. Methodological results

- ☐ The DRCE design has showed its capacity to analyse in one experiment forced and non forced choice.
- ☐ Results show some significant difference (higher in some case and lower in other) between the implicit price in both direction.
- ☐ The HEV model is shown to be a good alternative to the standard MNL by relaxing the IIA restriction.
- ☐ More empirical studies need to be done comparing the DRCE design with the traditional CE design.

6. CONCLUSIONS

6.2. Empirical results

- ☐ Consumers have a high preference for the local (Catalan) origin of the wine, revealing the importance of the Catalan identity in food consumer behaviour.
- ☐ The second highest preference refers to the “Cabernet Sauvignon” Variety.
- ☐ Wines that have been previously tasted by the consumer seem to be preferred over recommended or prestigious wines.